

CLARE, INC.
IWPS Description
Transmittal No. W201616

Clare Inc. Wastewater pH Neutralization Description

Clare Incorporated located at 78 Cherry Hill Drive, Beverly, Massachusetts 01915, manufactures semiconductor wafers and electronic components.

This facility contains four (4) main areas:

- 1) Wafer Fabrication (FAB) – this area contains the standard silicon semiconductor manufacturing processes: etch, diffusion, photolithography, implant, thin films, waferbonding and probe. This area will contribute 95% of the facility's process wastewater.
- 2) Final Test – consists of component electronic testing, marking, and packaging. There is no process wastewater generated in this area.
- 3) Facilities
- 4) Research & Development – this area performs failure analysis, benchmarking and prototype assembly of devices. This area contributes a small amount of industrial wastewater.

The Wastewater Pretreatment System consists of a three-stage automatic pH neutralization system. The system is equipped with appropriate high liquid level and high/low pH alarms and continuous pH and flow monitoring.

Wastewater is conveyed from the process areas via gravity flow through polypropylene drainpipes. The wastewater from different areas is fed directly into the first of three mixed tanks for pH adjustments. Wastewater is transferred from one tank to the next by displacement as new wastewater enters the treatment tank. Each tank is a 500-gallon cylindrical tank with a closed headspace. Wastewater is vigorously mixed in the first tank and the pH is measured. A process controller activates chemical feed pumps to add acid (sulfuric acid) or alkali (sodium hydroxide) as necessary. The first tank has an acid metering pump, a alkali metering pump and a high-capacity alkali pump. The second tank has an acid metering pump, a alkali metering pump and a high-capacity alkali pump. These two treatment stages shall provide maximum capacity for concentrated flows that occur in a transient manner. The third tank has one acid metering pump and one alkali metering pump for final adjustment, if needed. Each treatment stage has a bi-directional proportional, integral and derivative (PID) pH control. After treatment, the backgrind wastewater is combined with the treated process water. The combined flow is then monitored for pH and flow rate. The flow measurement is via ultrasonic level measurement as the flow passes through a Palmer-Bowlus flume. These measurements are recorded on individual circular chart recorders. A calculated totalizer flow is maintained in the flow display.

The pH controller settings are established by Clare Inc. in a manner as to allow the discharge to remain within DEP issued permit limitations.

The neutralization reactors are sized to provide a minimum of 15 minutes holding time (mean residence time) in each tank. All wastewater and treatment chemicals enter the tank at the top and treated wastewater flows out of the tank drawn 12 inches off the bottom. If the wastewater is not within the required range after the first treatment stage, the second stage will continue to treat the wastewater. The third stage provides additional neutralization if the wastewater is not within the required range after two treatment stages. Prior to final discharge to the sewer, the final effluent pH shall be monitored by a fourth pH sensor assembly mounted in a p-trap. This signal is recorded by a circular chart recorder.

If the pH is not within the pH limits an audible and visual alarm will be activated to notify the operator. These alarms are also connected to the facility maintenance shop to provide a means to notify all necessary personnel of the alarm condition.